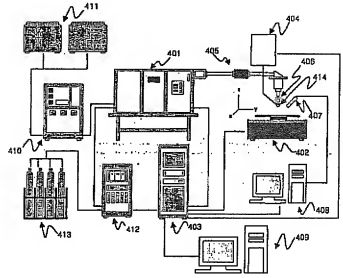
"The control system 403 [see Fig. 4 of Suh, below] receives data on the height of the molten pool from the image processing apparatus 408 every 20 msec, compares the data with shaping information transmitted from the CAD/CAM apparatus 409, and determines a laser power value required to allow the height of the molten pool to reach a target value. The value determined as described-above is digital data so the value is converted into an analog signal through a D/A converter and inputted to the laser generator 401."



It is apparent from this section of Suh, and the disclosure of Suh overall, that Suh stores no information from previous layers for use in subsequent layers. Rather, the sole, disclosed purpose of Suh is to speed up feedback during the generation of a given melt pool, then move on *with no memory of what occurred previously*. Indeed, the very fact that Suh is directed to real-time control proves that previously stored parameters cannot be used.

The Examiner now acknowledges that "Suh does not teach storing the sensed parameters." (OA, page 3, ¶5) But this concession makes the Examiner's arguments confusing. In particular, the Examiner argues that Suh teach "processing the stored parameters to determine an appropriate laser power for use during the deposition of a subsequent layer." (OA, page 3, ¶4) This is inconsistent since if Suh does not *store* parameters, he cannot *process* them [the stored parameters].

The Examiner submits that Suh discloses "processing" at Fig. 4, item 403 and Pg 4, 0054. This is true. Fig. 4, item 403 is a control system, and [0054] states that "the control system 403

serves to perform a laser cladding operation on the basis of shaping information received from the CAD/CAM apparatus 409 and control in real time cladding process parameters to allow the height of a cladding layer to reach a target value on the basis of information on the height of a molten pool received from the image processing apparatus 408. Alternatively, the control system may be comprised of a general numeric control system in place of the PC-NC system."

However, the Examiner's references to "subsequent layers" in Suh are erroneous. In particular, the Examiner argues that Suh teaches processing the stored parameters to determine an appropriate laser power "for use during the deposition of a subsequent layer" in the Abstract of Suh, lines 5-15 which read as follows:

> "This invention also provides a method of controlling the intensity of laser power, which is one of the most important process variables, regardless of the operational condition of a laser power unit (401). The method and system of this invention controls the height of a deposit (205) by real-time monitoring the position and the height of a melt pool (203) and controlling the process variables using the image photographing and image processing technology in such a laser cladding and laser-aided direct metal manufacturing process based on a laser surface modification technology, such as laser surface alloying..."

As can be seen from the passage cited by the Examiner, no mention is made of any subsequent layers. In fact, Suh makes it clear that "[t]he method and system of this invention controls the height of a deposit (205) by real-time monitoring the position and the height of a melt pool ... based on a laser surface modification technology..." The fact that Suh refers only to a *single* deposit associated with a *single* melt pool to modify a *single* surface makes it clear that subsequent layers are irrelevant.

Applicant's invention, on the other hand, solves the problem of substrate ***heat build-up*** during direct-metal deposition.

> "In particular, FIG. 2 [reproduced below] illustrates a typical workpiece generally indicated at 32, which includes an underlying metallic substrate 34 with a DMD deposited section 36 formed by a plurality of layers on its upper surface. As the initial layers of the deposited volume 36 are formed, much of the thermal energy of the laser goes to heating the underlying metallic substrate 34. As the deposition continues, the substrate reaches a maximum temperature and thereafter additional laser power goes to

melting the powdered metal in previously deposited areas. If constant laser power were applied to each area, the weld pool size would begin to grow as the substrate 34 heats up producing an irregular deposition pattern. The present invention compensates for this phenomenon."

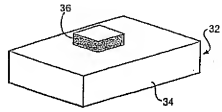


FIG - 2

In compensating for this phenomenon, stored parameters form previous layers *must be* used to control deposition during subsequent layers. Suh does not consider such a method or system for carrying this out. Nor does Such teach or suggest other limitations, such as the "sensing parameters of the melt pool at a plurality of selected coordinates during the generation of a plurality of metallic layers." It is Applicant's position that to the extent that Suh even senses at a plurality of selected coordinates, it is certainly not done "during the generation of a plurality of metallic layers" for later storage and retrieval.

Nevertheless, the Examiner argues that it would be obvious to combine Suh with Ito (with respect to claims 1-4, 8 and 9) "for the benefit of processing the image information by the image processor." (OA, page 3, ¶6) Applicants do not understand this rationale. Suh already "processes" the "image information by the image processor." This is entirely unrelated to Applicants' claimed steps of:

sensing parameters of the melt pool at a plurality of selected coordinates during the generation of a plurality of metallic layers;

storing the sensed parameters of the pool at each of the selected coordinates; and

processing the stored parameters to determine an appropriate laser power for use during the deposition of a subsequent layer.

Based upon the foregoing comments, Applicant believes the pending claims remain in condition for allowance. Questions regarding this application may be directed to the undersigned attorney at the telephone or facsimile numbers provided.

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Respectfully submitted,

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